EPSD Curriculum and HMH SCIENCE DIMENSIONS 2018 Alignment TEMPLATE

GRADE 4

EPSD Unit 7: Using Engineering Design with Force and Motion Systems
Fourth Marking Period

Overview: In this unit of study, students use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object. Students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents or from objects through collisions. They apply their understanding of energy to design, test, and refine a device that converts energy from one form to another. The crosscutting concepts of energy and matter and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems, planning and carrying out investigations, constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate their understanding of the core ideas. This unit is based on 4-PS3-4, 3-5-ETS1-1, 3-5-ETS1-2, and 3-5-ETS1-3.

Standards: (4-PS3-4) Apply scientific ideas to design, test, and refine a device that

Instructional Days: 15

HMH Science Dimensions Program Resources

Unit 1: Engineering and Design
Unit Video (rocket launching into outer space); **Unit Overview** p. 1; **Vocabulary** p. 3; **Making Connections** p. 3H; **Unit Project** p. 3I; **Unit Performance Task** pp. 60-61; **Unit Review** pp. 62-64

Standard for all Units: Interactive Glossary (D); Leveled Readers (D); Beginning-of-Year Test (D/P); Unit Pretest (D/P); Lesson Quizzes (D/P); Unit Test (D/P)

Note: Refer to the Curriculum Alignment Common Language (CACL) Guide to decipher acronyms.

Lesson 1: How Do Engineers Define Problems? pp. 4-21	**Lesson 2:** How Do Engineers Design Solutions? pp. 22-43	**Lesson 3:** How Do Engineers Test and Improve Prototypes? pp. 44-59
D/P- CYEI (video) Sounds a vole makes that the owl could hear. p. 5	D/P- CYEI (video) North American songbirds. pp. 22-23	D/P- CYEI (video) Early rocket designs. p. 45
P- ENB (prompt) What sounds do the vole makes that the owl could hear? What helps the animals on these pages find food and	P- ENB (prompt) Students are asked to study the image on p. 23 and come up with a description of a hearing-enhancing device. p. 23	P- ENB (prompt) How can collaboration and communication lead to improving your hearing-enhancing device prototype? p. 45

converts energy from one form to another. (3-5-ETS1-1) Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. (3-5-ETS1-2) Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. (3-5-ETS1-3) Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.		protect themselves from being eater? p. 5 D/P- Explore Kitchen Tech p. 6 D/P- AWYK HO Activity Engineered? (Students identify non living things that are Engineered and Not Engineered.) p. 7 P- ENB (prompt) Students identify criteria for thier hearing enhancer? p. 8 P- LS Students pick an everyday object, such as a backpack or lunchbox, that they would like to improve, and give the criteria for a successful improvement. p. 8 D/P- HO Activity Menu Planning p. 9-13 D/P- Bike Tech (Students match the safety constraints described to the bike parts.) p. 14 P- AWYK HO Activity Paper Building (Students work as a team to build the tallest structure they can build.) p. 15 P- ENB (prompt) Students think back to their hearing	D/P- Ears to You! (Students look closely at images to discover more about animal hearing in order to aid them in designing a hearing-enhancing device.) p. 24-26 D/P- Targeting Sound (Students view video and listen to the songbirds.) pp. 26-27 P- ENB (prompt) Students apply what they read on p. 27 to possible features of their hearing-enhancing device. p. 27 P- LS Students compare and contrast similarities and differences about the birds' songs and identify what else they might need to help them determine the type of bird they are listening to. p. 27 D/P- Looking Back to Look Forward (Students study pictures to discover more about aids to hearing.) pp. 28-29 P- AWYK HO Activity	P- HO Activity Class Collaboration (Students work with their class to further improve their team's design from the previous lesson) pp. 46-48 P- CER One student group work with another student group to discuss each other's claims and evidence in Step 8 from the HO Activity. p. 48 P- AWYK HO Activity Tissue Rope (Students work with a partner to find the best toilet paper rope-making technique using a 15-minute time limit.) p. 49 D/P- Too high, too low, too dry…just right! (Students look at the test bake pictures and the information for each cake and identify the likely ideal recipe choices). pp. 50-51 P- Students summarize their response to item 3 on p. 50. p. 51 D/P- Communication and Teamwork (Students watch the video to discover more about
Objective 1: Student will investigate and understand the characteristics of electricity and engineering design. **Objective 2:** Students will be able to create a testable question using poppers. **Objective 3:** Students will apply the engineering design process to a design challenge by creating a plan for project material expenses based on a budget and setting up an electric circuit using batteries, wire, and a motor.				

Objective 4: Students will observe how light transports energy into heat energy through the construction of solar ovens. **Topics:** Force and Motion Engineering Design Twenty-First Century Themes and Skills include: Environmental Literacy • The Four C's • Global Awareness **Essential Questions**: How can scientific ideas be applied to design, test, and refine a device that converts energy from one form to another?	enhancers and identify constraints relating to their solution. p. 16 D/P- TIF (enrich) People in Science: Marion Downs pp. 17-18 D- Writing within Constraints D- Limits in Nature D/P- Lesson Check pp. 19-20 D/P- Lesson Roundup p. 21 D- Lesson Quiz P- DI (ELL/RTI) p. 3G P-Extension p. 3G P- COLLAB p. 3H P- Making Connections p. 3H D- Science Safety HB D- CCC-HB D- ELA-HB D- SEP - HB D- ScienceSarurs Reference HB	Hear Here (Students work with a partner to compare two sounds) p. 30 D/P- More Testing (Students study images and listen to synopsis to discover more about other engineering designs and how they are tested) p. 32 D/P- Fair Tests (Students view the audio-testing system and select each spot to discover more about the parts of the audio-testing system) p. 33 P- ENB (prompt) Students explain how the criteria for their hearing-enhancing device affect what they will test. p. 34 P- HO Activity Design It! (Students collaborate with a team to design their own hearing-enhancing device.) pp. 35-37 P- CER Students cite evidence to support their claims in Step 5 from the HO Activity. p. 37 D/P- TIF (enrich) Careers in Science & Engineering:	communication and teamwork during a game of volleyball.) pp. 52-53 P- AWYK HO Activity Sharing Feedback (Students work in teams and give feedback on their designs.) p. 54 P- ENB (prompt) Students use what they have leaned in the lesson to describe how they can optimize their solution. p. 54 P- LS Recalling Relevant Information (Students use relevant information to explain what they have learned about the last few steps of an engineering design process.) p. 54 D/P- TIF (enrich) Sense Extenders for Science pp. 55-56 D- Ear Areas D- High or Low D/P- Lesson Check pp. 57-58 D/P- Lesson Roundup p. 59 D- Lesson Quiz P- DI (ELL/RTI) p. 3G

		Acoustic Engineer pp. 38-40 D- Hearing Aid History D- Don't Make a Move D/P- Lesson Check pp. 41-42 D/P- Lesson Roundup p. 43 D- Lesson Quiz P- DI (ELL/RTI) p. 3G P-Extension p. 3G P- COLLAB p. 3H P- Making Connections p. 3H D- Science Safety HB D- CCC-HB D- ELA-HB D- SEP - HB D- ScienceSarurs Reference HB D- YSI Simulation Engineering and Technology: Keeping it Warm and Cool	P-Extension p. 3G P- COLLAB p. 3H P- Making Connections p. 3H D- Science Safety HB D- CCC-HB D- ELA-HB D- SEP - HB D- ScienceSarurs Reference HB D- VBP It's a Bird! It's a Plane

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Curriculum Alignment Common Language (CACL) Guide K-5		
Acronym	**Word/Phrase**	**Description**
AWYK	Apply What You Know	Hands on opportunities for students to apply learning.
CER	Claims Evidence Reasoning	Students make a claim and gather evidence along the way (during EXPLORATORY activities) to support claim.
CYEI	Can You Explain It	Lesson phenomenon used to ENGAGE students in learning at the beginning of the lesson.
CYSI	Can You Solve It	Lesson phenomenon used to ENGAGE students in learning at the beginning of the lesson.
D	Digital	Program resources and features in interactive digital form.
DI (ELL/RTI) **Extension** **COLLAB** **Connections to Science**	Differentiated Instruction (English Language Learner/Response to Intervention) Collaboration Connections to Science	A page that lists all learning activities used to differentiate learning, engage students in collaborative activities and connect learning to other subjects.
DTM	Do the Math	Integrated subject learning.

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ENB	Evidence Notebook (prompt)	Student notebook or journal used to gather evidence during EXPLORATORY learning activities to support their claims.
ENGIT	Engineer It	Integrated subject learning.
HB **CCC-HB** **ELA-HB** **M-HB** **SEP-HB**	Handbooks Crosscutting Concepts English Language Arts Math Science and Engineering Practices	Students who need extra support in grasping concepts or to refresh student knowledge of skills.
HO	Hands-On (Activity)	Student collaboration activities.
LS	Language Smarts	Integrated subject learning.
P	Print	Program resources and features in print form.
TIF	Take It Further (enrich)	Enrichment activities for students in print or digital.
YSI	You Solve It (Simulation)	Open-ended simulation-based learning with multiple answer options.